



Figure Captions

Fig. 1. Structure Comparisons of (c) the proposed IGBT with (a) PT-IGBT and (b) NPT-IGBT.

Fig. 2. The key process steps for the new-structure IGBT fabrication.

- (a) Double-side ultra-deep phosphorus diffusion;
- (b) MOSFET cells fabrication after complete removal of the front side diffusion layer;
- (c) Grinding from backside
- (d) Transparent P^+ emitter fabrication by boron implantation.

Fig. 3. Simulated excess-carrier profiles in the n^- -base regions of the new structure IGBT and NPT-IGBT during on-state.

Fig. 4. Spreading Resistance Probing (SRP) analysis results from the backside of the fabricated sample.

Fig. 5. Measured collector-emitter breakdown curves of the fabricated new-structure IGBT sample and the fabricated NPT-IGBT sample.

Fig. 6. Measured inductive turn-off curves of the fabricated new-structure IGBT sample with $V_{CC}=1100V$, $I_C=15A$, $L=3mH$, $R_g=150\Omega$.

Fig. 7. Trade-off curves for the new structure IGBT and NPT-IGBT.

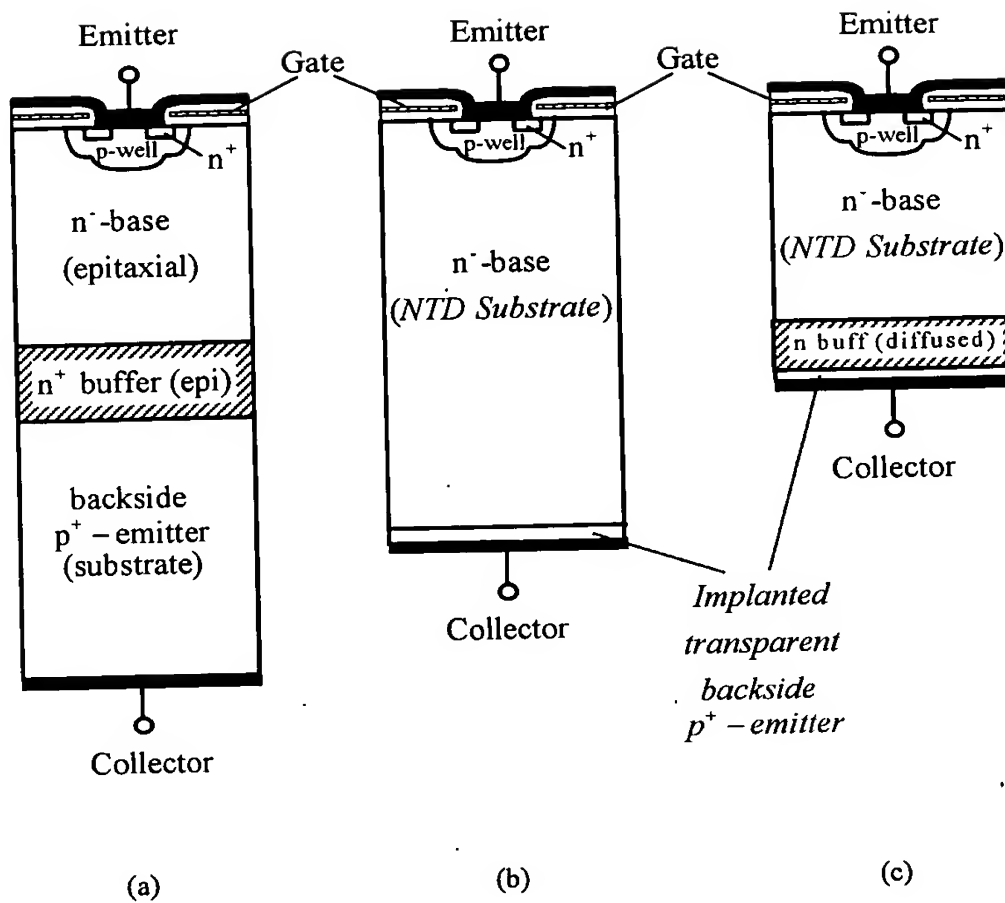
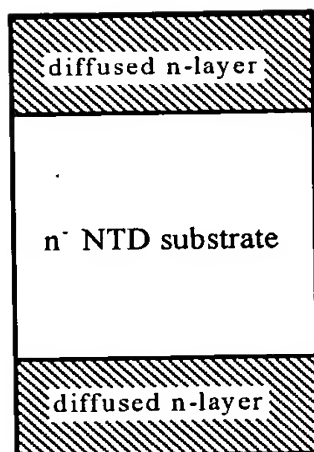
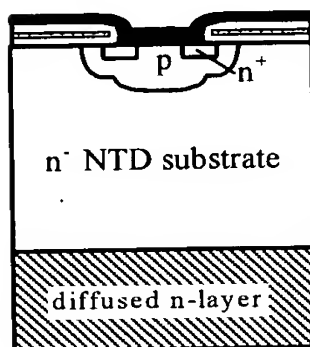


Fig. 1: X. Cheng *et al.*

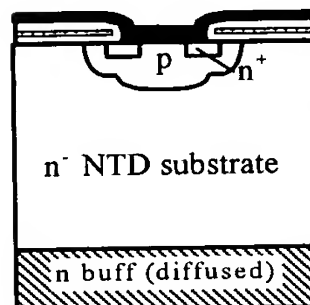
(a)



(b)



(c)



(d)

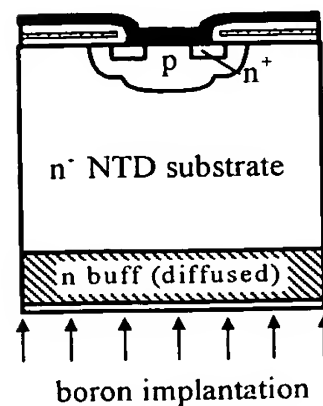


Fig. 2: X. Cheng *et al.*

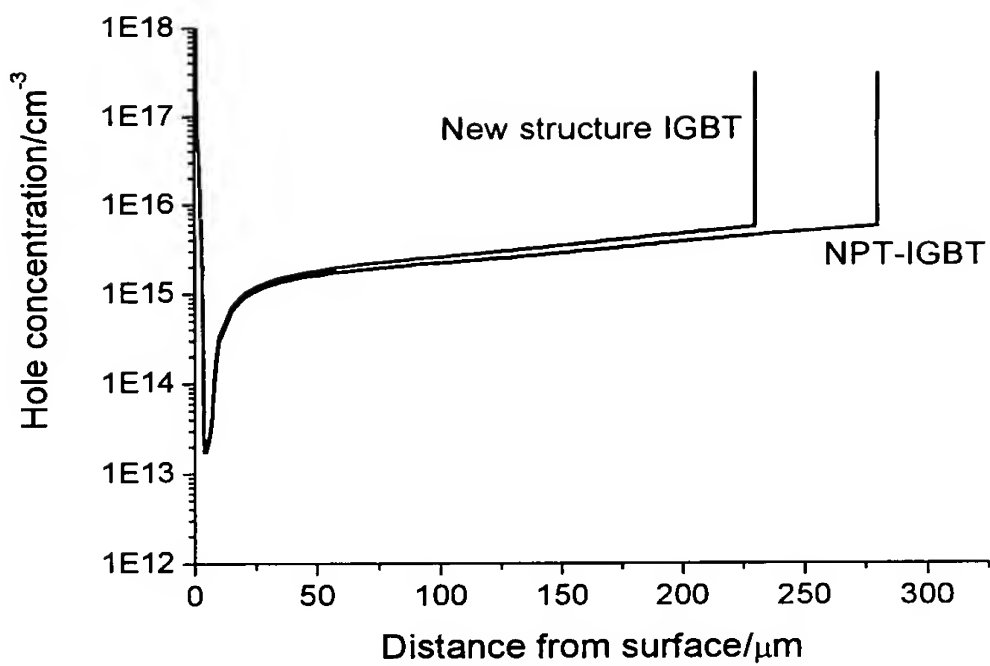


Fig. 3: X. Cheng *et al.*

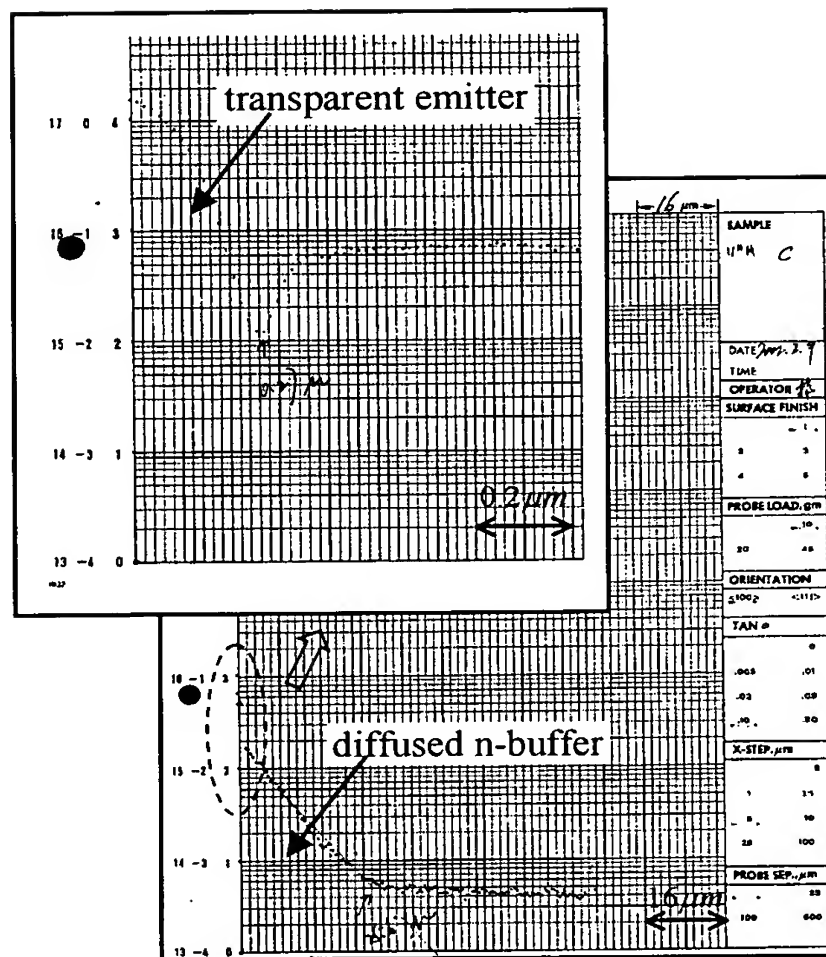


Fig. 4: X. Cheng *et al.*

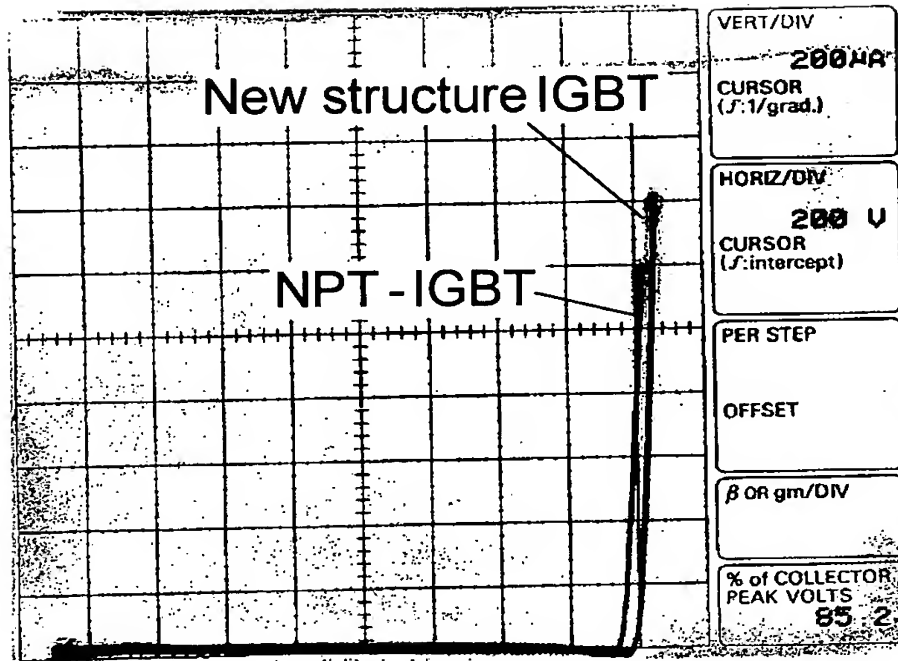


Fig. 5: X. Cheng *et al.*

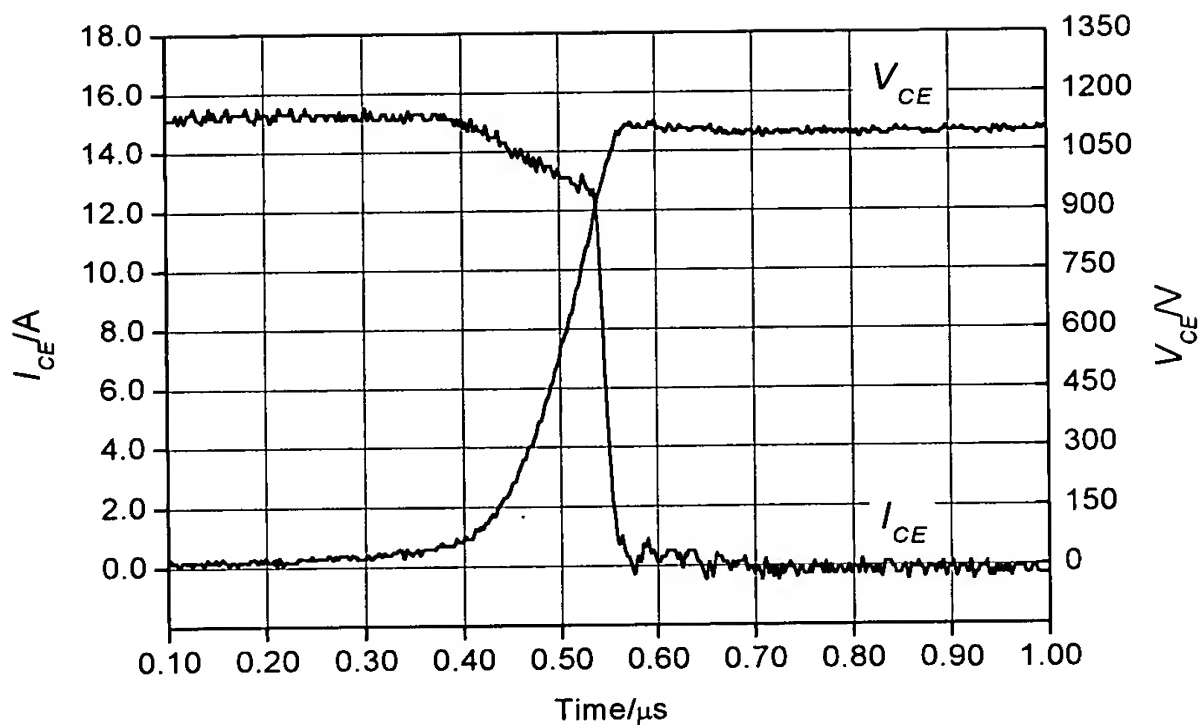


Fig. 6: X. Cheng *et al.*

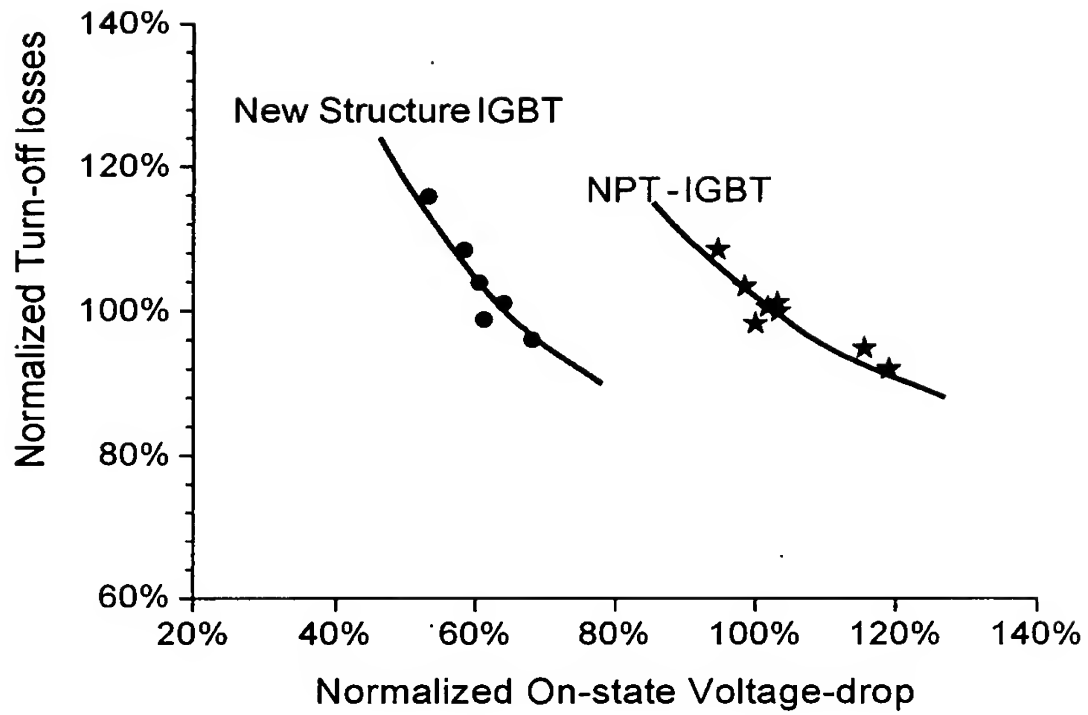


Fig. 7: X. Cheng *et al.*